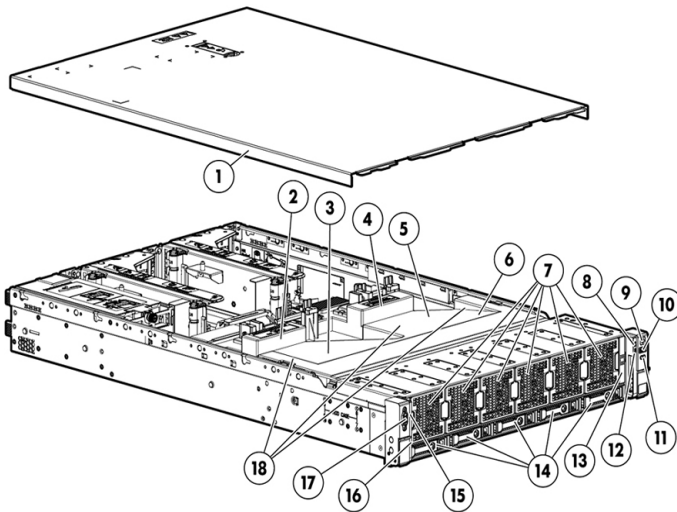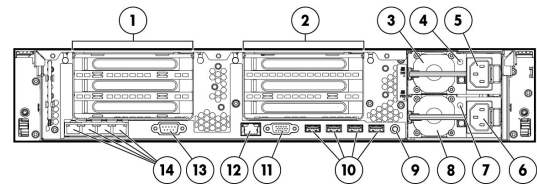## Overview

The HP ProLiant DL560 Gen8 is a brand new server in the ProLiant portfolio that redefines density-optimized 4-socket rack server technology without compromising on performance, scalability, and expandability. Supporting the new high-density and cost effective Intel® Xeon® E5-4600 processors, the DL560 Gen8 is ideal for virtualization, database, business processing, and general 4P data-intensive applications where optimization of data center space and price/performance is paramount.

The server is packed with the latest HP innovative and intuitive hardware and software features. Hardware enhancements include the HP SmartDrive carriers, HP Smart Socket guide, HP SmartMemory, FlexibleLOM technology, "3D Sea of Sensors", the new embedded Smart Array P420i RAID controller, and more. Software enhancements include HP Integrated Lifecycle Automation, Dynamic Workload Acceleration, Automated Energy Optimization, Intelligent Provisioning, agentless hardware monitoring, and Active Health System.

Front View:

1. Quick removal access panel
2. First Processor
3. Second Processor
4. Third Processor
5. Fourth Processor
6. Air Baffle
7. Hot-plug fans, full N+1 redundancy
8. Health LED
9. Power On /Standby button and system power LED button
10. USB connector
11. Unit ID LED
12. Aggregate Network LED
13. Systems Insight Display
14. Drive Bays
15. Access Tag
16. USB connector
17. Video connector
18. 48 DIMM slots: DDR3 Registered (RDIMM)

Rear View:

1. PCIe 3.0 Slots 1, 2, 3-PCIe 2.0 top to bottom
2. PCIe 3.0 Slots 4-6 top to bottom
3. Power supply 1
4. Power supply 1 Power LED
5. Power supply 1 Power connection (with Intelligent PDU communication)
6. Power supply 2 Power connection (with Intelligent PDU communication)
7. Power supply 2 Power LED
8. Power supply 2
9. Unit ID LED/Button
10. USB connectors (4)
11. Video connector
12. iLO connector
13. Serial connector
14. FlexibleLOM ports (Shown: 4 ports 1Gb each /Optional: 2 ports 10Gb each)

QuickSpecs

Standard Features

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

Processor One or more of the following depending on model	**Eight-Core Processors** Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) Processor Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) Processor Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) Processor Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) Processor **Six-Core Processors** Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) Processor Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) Processor Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) Processor **Four-Core Processors** Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) Processor
Cache Memory One of the following depending on model	20MB (1x20MB) Level3 **NOTE:** E5-4650, E5-4650L, E5-4640 processors 16MB (1x16MB) Level3 **NOTE:** E5-4620 processor 15MB (1x15MB) Level3 **NOTE:** E5-4617, E5-4610 processors 12MB (1x12MB) Level3 **NOTE:** E5-4607 processor 10MB (1x10MB) Level3 **NOTE:** E5-4603 processor **NOTE:** All processor models above list the L3 Cache associated with that particular processor.
Chipset	Intel® C600 Series Chipset Intel® E5-4600 Processor Family **NOTE:** For more information regarding Intel chipsets, please see the following URL: http://www.intel.com/products/server/chipsets/.
Upgradeability	Upgradeable to 4 processors (32 Cores) Up to 48 DIMM slots available for higher Memory capacity FlexibleLOM connector for 1 Gigabit or 10 Gigabit, QDR and FDR InfiniBand networking options 5SFF Hard drive bays Optional 3 slot riser (x16, x8, x8), or 2 slot (x16, x16) **NOTE:** To take advantage of the additional 3 PCI slot upgrade, the second processor must be installed. Redundant Power Supply

Standard Features

On System Management Processor	HP iLO (Firmware: HP iLO 4) **NOTE:** For more information, visit: http://www.hp.com/go/ilo	

Memory Protection	Advanced ECC **NOTE:** Advanced ECC uses single device data correction (SDDC) to detect and correct single and all multi-bit error that occurs within a single DRAM chip. Both x4 and x8 SDDC are supported (x8 requires lockstep mode). Online Spare **NOTE:** Memory online spare mode (also known as rank spare mode) detects a rank that is degrading and switches operation to the spare rank. Lock-step mode **NOTE:** Memory Lockstep mode is used to correct a single x8 DRAM device failure on a DIMM. The DIMMs in each paired memory channel must have identical HP part numbers.	

Memory One of the following depending on Model	Type	HP SmartMemory DDR3 Load Reduced (LRDIMM), Registered (RDIMM)
	DIMM Slots Available	48 (12 DIMM slots per processor /4 channels per processor/3 DIMMs per channel)
	Standard (Entry Model)	16GB (1x4GB) PC3L-10600R (DDR3-1333) Registered DIMMS
	Standard (Base Models)	32GB (4x4GB) PC3L-10600R (DDR3-1333) Registered DIMMS
	Standard (High Performance Models)	64GB (4x8GB) PC3-12800R (DDR3-1600) Registered DIMMS
	Maximum Capacity (RDIMM)	1.5TB (48x 32GB RDIMM @1600MHz)

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html
NOTE: LRDIMM, RDIMM are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen8 servers support RDIMM, UDIMM and LRDIMM.
NOTE: If only one processor is installed, only a quarter the DIMM slots are available. If only two processors are installed, only half the DIMM slots are available.
NOTE: Depending on the memory configuration and processor model, the memory speed may run at 1600MHz, 1333MHz, or 1066MHz. Please see Memory Population Table or the Online Memory Configuration Tool at: www.hp.com/go/ddr3memory-configurator.

Network Controller One of the following depending on Model	HP ProLiant Gen8 servers offer a new networking technology - Flexible Network Technology. The HP ProLiant DL560 Gen8 server offers the customer the choice of 1 Gigabit and/or 10 Gigabit networking solutions. For additional details see the Networking Section of this document.	
	Entry Models	HP Ethernet 1Gb 4-port 331FLR Adapter
	Base Models	HP Ethernet 1Gb 4-port 331FLR Adapter
	High Performance Models	HP Ethernet 1Gb 4-port 331FLR Adapter
		HP Ethernet 10Gb 2-port 530FLR-SFP+ Adapter

Standard Features

Expansion Slots

Primary Riser (Standard)	Expansion Slots #	Technology	Bus Width**	Connector Width*	Bus Number*	Form Factor	Notes
	1	PCIe 3.0	X16	X16	7	Full Length, Full Height Slot	Proc 1
	2	PCIe 3.0	X8	X8	10	Half Length, Full Height Slot	Proc 1
	3	PCIe 2.0	X4	X8	13	Half Length, Full Height Slot	Chipset

* Default bus assignment (in decimal). Inserting cards with PCI bridges may alter the actual bus assignment number
** Indicates the number of physical electrical lanes running to the connector.
NOTE: When populating the second optional riser slot, the second processor must be installed.
NOTE: Up to two 150w PCIe cards are supported, but an additional Power Cord Option is required (PN 669777-B21). See Option Section below for offering.

PCIe Riser (Optional 3-slot)	Expansion Slots #	Technology	Bus Width**	Connector Width*	Bus Number*	Form Factor	Notes
	4	PCIe 3.0	X16	X16	16	Full length, full height slot	Proc 2
	5	PCIe 3.0	X8	X8	20	Half length, full height slot	Proc 2
	6	PCIe 3.0	X8	X8	23	Half length, full height slot	Proc 2

* Default bus assignment (in decimal). Inserting cards with PCI bridges may alter the actual bus assignment number
** Indicates the number of physical electrical lanes running to the connector.
NOTE: When populating the second optional riser slot, the second processor must be installed.
NOTE: Up to two150w PCIe cardssupported, but an additional Power Cord Option is required (669777-B21). See Option Section below for offering

PCIe Riser (Optional 2-slot)	Expansion Slots #	Technology	Bus Width**	Connector Width*	Bus Number*	Form Factor	Notes
	4	PCIe 3.0	X16	X16	16	Full length, Full height slot	Proc 2
	5	PCIe 3.0	X16	X16	20	Half Length, Full Height	Proc 2

* Default bus assignment (in decimal). Inserting cards with PCI bridges may alter the actual bus assignment number
** Indicates the number of physical electrical lanes running to the connector.

Standard Features

HP Server ROM		HP ROM (Read Only Memory) is now digitally signed using HP's Corporate Signing Service. This signature is verified before the flash process starts, reducing accidental programming and preventing malicious efforts to corrupt system ROM.

HP ROM provides for essential initialization and validation of hardware components before control is passed to the customer-installed operating system. The ROM also provides the capability of booting from various fixed media (HDD, CD-ROM) and removable media (USB), to continue operation to the operating system.

HP ROM performs very early configuration of the video controller, to allow monitoring of initialization progress via an attached monitor. If configuration or hardware errors are discovered during this early phase of hardware initialization, suitable messages are now displayed on the connected monitor. Additionally, these configuration or hardware errors are logged to the Integrated Management Log (IML) to assist in diagnosis.

HP's ProLiant ROM is used to configure the following:

- Processor and chipset status registers
- System memory, memory map, and memory initialization
- System hardware configuration (Integrated PCI devices and optional PCIe cards).
- Customer-specific BIOS configuration (using the HP ROM-Based Setup Utility (RBSU).

NOTE: For further information, please refer to HP's RBSU (ROM based setup utility) user guide: www.hp.com/support/rbsu.

Storage Controller One of the following depending on Model	Entry Model	HP Smart Array P420i/ZM (RAID 0/1/1+0)
	Base Model	HP Smart Array P420i/1GB with FBWC (RAID 0/1/1+0/5/5+0)
	Performance Model	HP Smart Array P420i/2GB with FBWC (RAID 0/1/1+0/5/5+0)

Internal Storage Devices	Diskette Drive	None
	Optical Drive	None ship standard
		*Optional: USB DVD-RW available
	Hard Drives	None ship standard
	Drive Bays	Standard: 5SFF drive bays total

NOTE: All Pre-configured Models come populated with some hard drive blanks installed. Should the customer need additional hard drive blanks, they can order more using P/N 666987-B21: HP SFF Gen8 Hard Drive Blank Kit. These part numbers for single HDD blanks below are also provided should the customer require replacement HDD blanks for their server.

Maximum Internal Storage	Hot Plug SFF SAS	5.0TB	5 x 1TB
	Hot Plug SFF SAS SSD	4.0TB	5 x 800GB
	Hot Plug SFF SATA SSD	2.0TB	5 x 400GB

QuickSpecs

Standard Features

Interfaces	Serial	1
	Video	2 (1 front, 1 back) not active simultaneously
	FlexibleLOM Network Ports	Some models come standard with 4 x 1GB ports while others come with 2 x 10GB ports (See HP Networking section below for more details and options).
	HP iLO Remote Management Network Port	1 Gb Dedicated
	Micro SD slot	1 Internal Secure **NOTE:** The SD slot is not a hot-pluggable device. Customers should not attempt to plug an SD card into the SD slot while the server is powered.
	USB 2.0 Ports	7 total: 2 front, 4 back, 1 internal

Industry Standard Compliance	ACPI 2.0b Compliant
	PCIe 3.0 Compliant
	PXE Support
	WOL Support
	Microsoft® Logo certifications
	USB 2.0 Compliant

Server Power Cords

All Pre-configured servers ship with a high voltage server-to-PDU power cord.
NOTE: HP ProLiant DL servers no longer ship standard with a 12-foot NEMA 5-15P to C13 power cord that connects to 110V US wall outlets in a home or office. ProLiant DL servers are primarily connected to power distribution units (PDUs) in data center racks and now ship standard with a PDU 6-foot C-14 to C13 power cord (A0K02A). If a user wishes to power a ProLiant DL server using a 110V receptacle (NEMA-15), the 6-foot NEMA 5-15 to C13 power cord must be ordered separately (AF556A). See Power Cords section for Worldwide Power Cord options.

Power Specifications

To review typical system power ratings use the HP Power Advisor which is available via the online tool located at URL: www.hp.com/go/proliant-energy-efficient or www.hp.com/go/hppoweradvisor.

NOTE: Power Specification and Technical Content for supported power supplies can be found at:
http://h18000.www1.hp.com/products/quickspecs/14209_div/14209_div.html

Standard Features

Common Slot Power Supply	HP's Common Slot (CS) power supplies allow for commonality of power supplies across a wide range of ProLiant and Integrity servers, as well as HP Storage solutions, and are designed to provide the highest power supply efficiency without degrading system performance. HP CS power supplies are tested by the Electric Power Research Institute (EPRI) and certified through the ECOS 80 Plus power supply program. HP CS power supply options provide efficiency ratings of up to 94% (80 Plus Platinum) and are available in up to 1200W power output. All HP Common Slot power sources are UL, CE Mark Compliant, hot-plug and support redundant configurations.

NOTE: Mixing of power supplies in the same server is not supported. All power supplies must be of the same output and efficiency rating. If non-matched power supplies are inserted you will get errors and operation will fail.

HP CS Platinum Plus power supplies are required when enabling HP's Intelligent Power Discovery (IPD) solution. IPD is the first technology to create an automated, energy-aware network between IT systems and facilities. This allows your company to reclaim millions of dollars in wasted power capacity and downtime costs across data centers. For more information on HP's IPD solution, go to www.hp.com/go/ipd.

It is highly recommended that you use the HP Power Advisor in defining the "Right-Size" power supply for your needs. HP Power Advisor can be accessed at: www.hp.com/go/hppoweradvisor.

NOTE: The 80 PLUS program is a unique forum that unites electric utilities, the computer industry, and consumers in an effort to bring energy efficient technology solutions to the marketplace. 80 Plus independently tests power supply efficiency and publicly posts the results on 80Plus.org.
Redundant Power: Optional (1+1 or n+n redundant) power supplies can be purchased through power supply option kits (see Power Supplies for part numbers).

NOTE: Power Specification and Technical Content for supported power supplies can be found at: http://h18000.www1.hp.com/products/quickspecs/14209_na/14209_na.html

System Fans	6 fans (N+1 redundancy standard)

Required Cabling	For required cabling information, refer to the HP Web site at: www.hp.com/servers/dl560-gen8.

Operating Systems and Virtualization Software Support for ProLiant Servers	Microsoft Windows Server Red Hat Enterprise Linux (RHEL) SUSE Linux Enterprise Server (SLES) Oracle Solaris VMware Citrix XenServer

NOTE: For more information on HP's Certified and Supported ProLiant Servers for OS and Virtualization Software and latest listing of software drivers available for your server, please visit our Support Matrix at: http://www.hp.com/go/ossupport and our driver download page: http://www.hp.com/support/DL560Gen8

Standard Features

Graphics	Integrated Matrox G200 video standard

- 1280 x 1024 (32 bpp)
- 1920 x 1200 (16 bpp)

HP iLO 4 On System Management Memory

- 16 MB Flash
- 256 MB DDR 3 with ECC (112 MB after ECC and video)

Form Factor

2U Rack form factor, ships with ball bearing rails and cable management system
NOTE: Gen8 rail kits have changed significantly from prior generation rail kits. Please take a moment to review the installation documentation that comes with the server to help you with the installation of your Gen8 server.
CAUTION: HP recommends that at least two people are used for all rack server installations. Please refer to your installation instructions for proper tools and number of people to use for any installation.
3.44 (8.74 cm) Height x 17.54" (44.55 cm) Width x 29.5" (74.94 cm) Length

---

On System Management   HP iLO Management Engine

HP iLO Management Engine is a comprehensive set of embedded management features supporting the complete lifecycle of the server, from initial deployment, through ongoing management, to service alerting and remote support. HP iLO Management Engine comes standard on all HP ProLiant Gen8 servers. The HP iLO Management Engine portfolio includes:

- **HP iLO:** The HP iLO (Integrated Lights-Out) management processor is the core foundation for the HP iLO Management Engine
- **HP Agentless Management:** Provides built in server health monitoring and alerting capability without OS agents, that starts working the moment a power cord and an Ethernet cable are connected.
- **HP Active Health System:** Always on, continuous monitoring for increased stability and shorter downtimes; 100% configuration history; Health and service alerts and easy export and upload to Service and Support.
- **HP Intelligent Provisioning:** Lets customers provision and configure a single server without any separate media. No more SmartStart CDs or Smart Update Firmware DVD are needed.
  - To start Intelligent Provisioning:
    - Press the F10 key during the ProLiant Gen8 server boot process (also known as power on self test or POST).
    - Please go to the Intelligent Provisioning website at www.hp.com/go/intelligentprovisioning for additional information and to view usage videos.
    - Use the Service Pack for ProLiant (SPP) at www.hp.com/go/spp to get firmware and software updates.
- **HP iLO Mobile App:** Enables the ability to access, deploy, and manage your server anytime from anywhere from select smartphones and mobile devices. For additional information please visit: www.hp.com/go/ilo/mobileapp

---

Standard Features

NOTE: For more information, visit: http://www.hp.com/go/ilo or HP iLO Management Engine technologies whitepaper

HP Insight Management	HP Service Pack for ProLiant	HP Service Pack for ProLiant (SPP) and HP Smart Update Manager (HP SUM) version 5 provide a new, comprehensive approach to firmware and system software maintenance. Together they provide better operating stability and ensure maximum uptime. The SPP will be updated at a predictable cadence, typically coinciding with new HP server hardware launches. By enabling firmware to be updated online and integrating firmware and system software updates in one operation HP SUM and the SPP offer faster updates of individual servers and dramatically faster updates of entire BladeSystem enclosures. Further improving system uptime and stability is the fact that HP provides 12 months of support on each Service Pack for ProLiant.

The user experience around HP SUM and the SPP has been improved in several ways, starting with the web download. A single web page provides access to a single download containing both the latest version of HP SUM version 5 and the latest SPP. Optional smaller subsets with only specific types of servers or specific operating systems are offered to save on download time. The HP SUM application has been re-written to provide a more straightforward, intuitive user interface that guides the user through the steps of discovery, analyses and update, providing comprehensive information on available updates, criticality and interdependencies. This information is also available in reports. By providing the option of multiple local or shared repositories which can be easily updated from hp.com, HP SUM provides the tools to optimize stability and consistency throughout the company. While HP SUM and the SPP will recommend the combinations of firmware and system software that HP has found to be the best practice, the application gives customers the flexibility to set their own specific baseline.

The Service Pack for ProLiant has been rigorously tested with specific attention for interaction between firmware, drivers and agents both within the server as well as in interaction with the BladeSystem enclosure components (Onboard Administrator and Virtual Connect). This testing ensures the highest quality as well as providing the input for HP SUM to deploy updates taking into account all interdepencies, when determining the correct updates and order of update deployment.

NOTE: The Service Pack for ProLiant (which includes HP SUM 5) can be downloaded from: www.hp.com/go/spp/download. More information can be found: http://www.hp.com/go/spp and http://www.hp.com/go/hpsum |
| **Security** | Power-on password
Serial interface control
Administrator's password | |

Standard Features

Warranty

This product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners resellers. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HP Care Pack services or customized service agreements. Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

NOTE: Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have HP replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at:

http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html

Optional Features

HP Insight management	HP Insight Control	HP Insight Control, a product option, delivers essential infrastructure management that can help save time and money by making it easy to deploy, migrate, monitor, remote control, and optimize your IT infrastructure through a single, simple management console. HP Insight Control also supports Location and Power Discovery Services to automate many configuration, asset tracking, and power management tasks to speed implementation and prevent downtime. For more information, see http://www.hp.com/go/insightcontrol. HP Insight Control includes one year of 24 x 7 HP Software Technical Support and Update Service ensuring rapid access to HP support staff and proactive delivery of software updates. For more information about this service, see: http://www.hp.com/services/insight.
	HP Matrix Operating Environment	The HP Matrix Operating Environment (Matrix OE) for ProLiant and Integrity servers is an integrated command center that helps you instantly adjust to dynamic business demands. This advanced infrastructure management software lets you reduce the cost of common data center tasks by up to 40 percent while keeping pace with your changing business. The HP Matrix OE includes the automated provisioning, optimization, and recovery management capabilities for HP CloudSystem Matrix, the ideal platform for private cloud and Infrastructure as a Service (IaaS). **NOTE:** For more information, visit: http://www.hp.com/go/matrixoe
	HP iLO Advanced License for ProLiant Servers	HP iLO management processors for HP ProLiant Gen8 servers virtualizes system controls to help simplify server setup, engage health monitoring and power and thermal control, and promote remote administration. HP iLO functions out-of-the-box without additional software installation and functions regardless of the servers' state of operation. Basic system board management functions, diagnostics, and essential Lights-Out functionality ships standard across all HP ProLiant Gen8 rack, tower and blade servers. The HP iLO can be accessed from any location via a web browser and works hand-in-hand with HP Systems Insight Manager, Insight Control, and HP Matrix Operating Environment, helping customers unleash the value of the ProLiant platform and deliver the highest possible quality of IT service to the business. Advanced functionality, such as graphical remote console, multi-user collaboration, and video record/playback can be activated with the optional HP iLO Advanced or HP iLO Advanced for BladeSystem licenses. The Advanced licensed features offer sophisticated remote administration of servers in dynamic data center and remote locations and can help significantly reduce cost associated with IT-related travel and unplanned downtime. **NOTE:** For more information, visit: http://www.hp.com/go/ilo

Optional Features

High Performance Clusters	HP Cluster Platforms	HP Cluster Platforms are specifically engineered, factory-integrated large-scale ProLiant clusters optimized for High Performance Computing, with a choice of servers, networks and software. Operating system options include specially priced offerings for Red Hat Enterprise Linux and SUSE Linux Enterprise Server, as well as Microsoft Windows HPC Server. A Cluster Platform Configurator simplifies ordering. http://www.hp.com/go/clusters
	HP HPC Interconnects	High Performance Computing (HPC) interconnect technologies are available for this server as part of the HP Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by HP when integrated within an HP cluster. Flexible, validated solutions can be defined with the help of configuration tools. http://www.hp.com/techservers/clusters/ucp/index.html
	HP Insight Cluster Management Utility	HP Cluster Management Utility (CMU) is an HP-licensed and HP-supported suite of tools that are used to manage large-scale Linux ProLiant systems. CMU includes software for the centralized provisioning, management and monitoring of nodes. CMU makes the administration of clusters user friendly, efficient, and effective. http://www.hp.com/go/cmu
	HP HPC Linux Value Pack	HP HPC Linux Value Pack (Value Pack) is an HP-licensed and HP-supported option to HP Insight CMU, for the development and deployment of applications on HPC Cluster Platforms. Value Pack includes the Platform LSF workload scheduler and Platform Application Center, as well as the HP-MPI parallelization library. HP HPC Linux Value Pack

HP Insight Online
HP Insight Online is a new addition to the HP Support Center for one stop, secure access to product and HP support information personalized to your IT environment. Insight Online can automatically display devices remotely monitored by HP Insight Remote Support. With Insight Online's easy navigation you can efficiently track your IT support contracts and device status from anywhere and at anytime. www.hp.com/go/insightonline

Factory Express Portfolio for Servers and Storage
HP Factory Express offers configuration, customization, integration and deployment services for HP servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. HP products supported through Factory Express include a wide array of servers and storage: HP Integrity, HP ProLiant, HP ProLiant Server Blades, HP BladeSystem, HP 9000 servers as well as the MSAxxxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches.

For more information on Factory Express services for your specific server model please contact your sales representative or go to: http://www.hp.com/go/factory-express.

Optional Features

HP Simple Configurator   SCE is a guided self service tool to help sales and non technical people provide customers with initial configurations in 3 to 5 minutes. You may then send the configuration on for configuration help, or use in your existing ordering processes. If you require "custom" rack configuration or configuration for products not available in SCE, please contact HP's Customer Business Center or an Authorized Partner for assistance. http://www.hp.com/products/configurator

Service and Support

Service and Support	**HP Technology Services for Industry Standard Servers and BladeSystem** Capitalizing on HP ProLiant server and HP BladeSystem capabilities requires a service partner who understands your increasingly complex business technology environment. That's why it makes sense to team up with the people who know HP infrastructure hardware and software best - the experienced professionals at HP Services. **What HP ProLiant and BladeSystem Services can do for you** HP ProLiant and BladeSystem Services can help you design, deploy, test, integrate, support, and manage IT and infrastructure solutions. This way, HP proposes services solutions that include more than just uplift of base warranty. Foundation Care services deliver scalable support-packages for HP industry-standard servers and software. You can choose the type and level of service that is most suitable for their business needs. New to this portfolio is HP Collaborative Support. If you are running business critical environments, HP offers Proactive Care or Critical Advantage. These services help deliver high levels of application availability through proactive service management and advanced technical response You can get the support you need by choosing from one of a number of service packaged solutions we have designed to address wider set of customer support needs. HP Technology Services meets business challenges with services offered in three support recommendations - **Optimized Care, Standard Care, and Basic Care** - available for each product group. Such support solutions enable customers to optimize technology operations, minimize risk and drive better business outcomes with easy-to-buy, easy-to-use scalable support recommendations for servers, storage, networking and software designed to meet your specific needs. All three service recommendations include support services from the broader portfolio of Foundation Care and Proactive Care services.
Optimized Care	**Optimized Care : Supports maintaining servers at optimum performance availability** **HP ProLiant Server Hardware Installation** Provides for the basic hardware installation of HP branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-9356EN.pdf **HP Installation and Startup for Insight Control Software / HP SIM** Provides for the deployment and basic configuration of HP Insight Control or HP SIM (Systems Insight Manager) on HP ProLiant ML and DL series servers or HP BladeSystem servers http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA0-9972ENW.pdf **3-Year HP 24x7 4 hour Response, Proactive Care** Helps optimize your systems and delivers high levels of application availability through proactive service management and advanced technical response. A skilled Technical Manager will own your call and end to end until resolved, delivering a single point of contact for you. Helping you to resolve your hardware and software issues and minimizing downtime in your business critical environment. **Additional Services:** Factory Express, Education Services, Proactive Select - 30 Credit Package
Standard Care	**Standard Care :** Service recommendation that maintains high level of server availability **HP ProLiant Server Hardware Installation** Provides for the basic hardware installation of HP branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner

Service and Support

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-9356EN.pdf

HP Installation and Startup for Insight Control Software / HP SIM
Provides for the deployment and basic configuration of HP Insight Control or HP SIM (Systems Insight Manager) on HP ProLiant ML and DL series servers or HP BladeSystem servers
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA0-9972ENW.pdf

3-Year HP 24x7 4 hour Response, Collaborative Support
Provides problem resolution support across the stack of HW, firmware, and HP and 3rd party SW. In case the issue is with 3rd party SW, HP does known issue resolution. If HP cannot solve the issue, it will contact the third-party vendor and create a problem incident on your behalf.
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-8232ENW.pdf

Additional Services: Software support service with 24X7 availability with a 2 hour response, Training courses on Microsoft, Linux (Red Hat and SUSE), VMware, and HP Insight Software, 10 Proactive Select Credit package, Factory Express
http://www8.hp.com/us/en/business-services/it-services.html?compURI=1078865

Basic Care	**Basic Care:** delivers minimum recommended support service level

HP ProLiant Server Hardware Installation
Provides for the basic hardware installation of HP branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner
http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-9356EN.pdf

3-Year HP 24x7 4 hour Response, Hardware Support Onsite Service
Provides you with rapid remote support and if required an HP authorized technical engineer will be on site 24X7 begin hardware maintenance service within 4 hours of the service request being logged
http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-6547EEE.pdf

3-Year , HP 24x7 Software Support for Insight Control
Provides remote 3-year software support service that delivers comprehensive software services, including access to HP technical resources and software updates
http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6645EEE.pdf

Additional Services: Factory Express, Education Services, Proactive Select - 10 Credits

Insight Remote Support	Provides 24 X 7 remote monitoring, proactive notifications, and problem resolution. Learn more http://www.hp.com/go/insightremotesupport
HP Support Center	Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more http://www.hp.com/go/hpsc

HP's Support Center Mobile App* allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime.
HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement.

*HP' Support Center Mobile App is subject to local availability

Warranty / Service Coverage	For ProLiant servers and storage systems, the services cover HP-branded hardware options qualified for the server, purchased at the same time or afterward, internal to the enclosure, as well as external monitors up to 22" and tower UPS products; these items will be covered at the same service level and for the same coverage period as the server unless the maximum supported lifetime and/or the maximum

Service and Support

usage limitation has been exceeded. Coverage of the UPS battery is not included; standard warranty terms and conditions apply.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction. It does not apply to any exchange of Disk or SSD/Flash Drives that have not failed. SSD/Flash Drives that are specified by HP as consumable parts and/or that have exceeded maximum supported lifetime and/or the maximum usage limit as set forth in the manufacturer's operating manual or the technical data sheet are not eligible for the defective media retention service feature option.

For more information   To learn more on HP ProLiant servers and HP BladeSystem servers, please contact your HP sales representative or HP Authorized Channel Partner. Or visit: http://www.hp.com/services/proliant

Pre-configured Models

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

NOTE: Pre-configured models ship with the configurations below. Options can be selected from the Core or Additional options section of this QuickSpecs.

NOTE: HP does not allow factory integration of options into pre-configured models. Any additional options purchased will be shipped separately.

NOTE: If you desire a custom configuration please see "Configuration Information - Factory Integrated Models" section of this QuickSpecs.

NOTE: All Pre-configured Models come populated with some hard drive blanks installed. Should the customer need additional hard drive blanks, they can order more using either P/N 666987-B21: HP SFF Gen8 Hard Drive Blank Kit or P/N 666986-B21: HP LFF Gen8 Hard Drive Blank Kit.

Entry Models

HP ProLiant DL560 Gen8 E5-4603 2P 16GB-R Hot Plug SFF 1200W PS Server 686786-001	**Processor(s)**	(2) Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/6.4GT-s QPI/95W) Processors
	Cache Memory	10MB (1x10MB) Level 3
	Memory	16GB (2x8GB) PC3L-10600R (DDR3-1333) Registered DIMMS **NOTE:** Total 48 DIMM slots available with processor upgrade (4P configuration)
	Network Controller	HP Ethernet 1Gb 4-port 331FLR Adapter
	Storage Controller	HP Smart Array P420i/ZM (RAID 0/1/1+0)
	Hard Drives	None ship standard
	Internal Storage	Standard: 5 SFF SAS HDD Bays; includes 3 SFF hard drive blanks
	Optical Drive Bay	Optional External USB Optical Drive (Mobile USB DVDRW Optical Drive)
	PCI-Express Slots	3 PCIe slots (Up to 3 additional PCIe slots available with optional riser)
	Power Supply	(1) HP 1200W Common Slot Platinum Plus Hot Plug Power Supply (94% Efficient)
	Fans	(6) (N+1 redundancy standard)
	Management	HP iLO Management Engine (standard) Optional: HP Insight Control
	Form Factor	Rack (2U), HP Ball Bearing Rail Kit/Cable Management Arm Standard
	Warranty	Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response.

QuickSpecs

Pre-configured Models

Base Models

HP ProLiant DL560 Gen8 E5-4610 2P 32GB-R Hot Plug SFF 1200W PS Server
686785-001

Processor(s)	(2) Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/6.4GT-s QPI/95W) Processors
Cache Memory	15MB (1x15MB) Level 3
Memory	32GB (4x8GB) PC3L-10600R (DDR3-1333) Registered DIMMS **NOTE:** Total 48 DIMM slots available with processor upgrade (4P configuration)
Network Controller	HP Ethernet 1Gb 4-port 331FLR Adapter
Storage Controller	HP Smart Array P420i/1GB FBWC (RAID 0/1/1+0/5/5+0)
Hard Drives	None ship standard
Internal Storage	Standard: 5 SFF SAS HDD Bays; includes 3 SFF hard drive blanks
Optical Drive	Optional External USB Optical Drive (Mobile USB DVDRW Optical Drive)
PCI-Express Slots	3 PCIe slots (Up to 3 additional PCIe slots available with optional riser)
Power Supply	(2) HP 1200W CS Platinum Plus Hot Plug Power Supply (94% Efficient)
Fans	(6) (N+1 redundancy standard)
Management	HP iLO Management Engine (standard) Optional: HP Insight Control
Form Factor	Rack (2U), HP Ball Bearing Rail Kit /Cable Management Arm standard
Warranty	Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response.

Performance Models

NOTE: These Models are Energy Star Certified.

HP ProLiant DL560 Gen8 E5-4640 4P 64GB-R Hot Plug SFF 1200W PS Server
686784-001

Processor(s)	(4) Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/6.4GT-s QPI/95W) Processors
Cache Memory	20MB (1x20MB) Level 3
Memory	64GB (8x8GB) PC3-12800R (DDR3-1600) Registered DIMMS **NOTE:** Total 48 DIMM slots available with processor upgrade (4P configuration)
Network Controller	HP Ethernet 10Gb 2-port 530FLR-SFP+ Adapter
Storage Controller	HP Smart Array P420i/2GB FBWC (RAID 0/1/1+0/5/5+0)
Hard Drives	None ship standard
Internal Storage	Standard: 5 SFF SAS HDD Bays; includes 3 SFF hard drive blanks
Optical Drive Bay	Optional External USB Optical Drive (Mobile USB DVDRW Optical Drive)
PCI-Express Slots	6 PCIe slots (secondary riser included by default)
Power Supply	(2) HP 1200W CS Platinum Plus Hot Plug Power Supplies (94% Efficient)
Fans	(6) (N+1 redundancy standard)
Management	HP iLO Management Engine (standard) HP Insight Control Standard
Energy Star	Meets Energy Star requirements
Form Factor	Rack (2U), HP Ball Bearing Rail Kit /Cable Management Arm standard

Pre-configured Models

Warranty   Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response.

Smart Buys

HP ProLiant DL560 Gen8 E5-4650 2.7GHz 8-core 2P 64GB-R Hot Plug SFF 1200W PS Server 697607-S01	**Processor(s)**	(2) Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/8.0GT-s QPI/130W) Processors
	Cache Memory	20MB (1x20MB) Level 3
	Memory	64GB (8x8GB) PC3L-12800R (DDR3-1600) Registered DIMMS **NOTE:** Total 48 DIMM slots available with processor upgrade (4P configuration).
	Network Controller	HP Ethernet 1Gb 4-port 331FLR Adapter
	Storage Controller	HP Smart Array P420i/ZM (RAID 0/1/1+0)
	Hard Drives	None ship standard
	Internal Storage	Standard: 5 SFF SAS HDD Bays; includes 3 SFF hard drive blanks
	Optical Drive	Optional USB DVD-RW/ROM Optical Drive
	PCI-Express Slots	3 PCIe slots (+3 PCI slots available with upgrade option)
	Power Supply	(2) HP 1200W CS Platinum Plus Hot Plug Power Supply (94% Efficient)
	Fans	(6) (N+1 redundancy standard)
	Management	HP iLO Management Engine (standard) Optional: HP Insight Control
	Form Factor	Rack (2U), HP Ball Bearing Rail Kit /Cable Management Arm standard
	Warranty	Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response.

HP ProLiant DL560 Gen8 E5-4617 2.9GHz 6-core 2P 64GB-R Hot Plug SFF 1200W PS Server 697608-S01	**Processor(s)**	(2) Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/7.2GT-s QPI/130W) Processors
	Cache Memory	15MB (1x15MB) Level 3
	Memory	64GB (8x8GB) PC3L-12800R (DDR3-1600) Registered DIMMS **NOTE:** Total 48 DIMM slots available with processor upgrade (4P configuration).
	Network Controller	HP Ethernet 1Gb 4-port 331FLR Adapter
	Storage Controller	HP Smart Array P420i/ZM (RAID 0/1/1+0)
	Hard Drives	None ship standard
	Internal Storage	Standard: 5 SFF SAS HDD Bays; includes 3 SFF hard drive blanks
	Optical Drive	Optional USB DVD-RW/ROM Optical Drive
	PCI-Express Slots	3 PCIe slots (+3 PCI slots available with upgrade option)
	Power Supply	(2) HP 1200W CS Platinum Plus Hot Plug Power Supply (94% Efficient)
	Fans	(6) (N+1 redundancy standard)
	Management	HP iLO Management Engine (standard) Optional: HP Insight Control
	Form Factor	Rack (2U), HP Ball Bearing Rail Kit /Cable Management Arm standard
	Warranty	Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response.

Configuration Information - Factory Integrated Models

NOTE: This section lists some of the steps required to configure a Factory Integrated Model. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for information on configurable product offerings and requirements.
NOTE: Factory Integrated Models must start with a CTO Server.
NOTE: FIO indicates that this option is only available as a factory installable option.
NOTE: All Factory Integrated Models will be populated with sufficient hard drive blanks based on the number of initial hard drives ordered with the server.

Step 1: Base Configuration (choose one of the following configurable models)

HP Models   HP ProLiant DL560 Gen8 Configure-to-order Server   686792-B21

Factory Integrated Models ship with:

4 x HP Smart Socket Guides for fast processor installation.
48 DIMM slots for RDIMM and LRDIMM Memory installation
1 FlexibleLOM connector: (see Step2: HP Flexible NIC section below for NIC choices to populate the embedded connector)
Smart Array P420i Controller w/ Zero Memory (ZM)
I/O slots - 3 Slots come standard:

- Slot 1 - FL/FH x16 PCIe 3.0 (x16 connector)
- Slot 2 - HL/FH x8 PCIe 3.0 (x8 connector)
- Slot 3 - HL/FH x4 PCIe 2.0 (x8 connector)
- Additional Slots may be added via selections from the PCI Information and Options subsection

(1) HP 1200W CS Platinum Plus Hot Plug Power Supply (94% Efficient)
System Fans - 6 (N + 1 redundancy standard)
Drive Cage - 5SFF (Optical media drive optional)
USB - 4 Rear, 2 Front, 1 Internal, 1 Micro SD slot
HP iLO Management Engine (standard)
HP Ball Bearing Rail Kit and Cable Management Arm
NOTE: Gen8 rail kits have changed significantly from prior generation rail kits. Please take a moment to review the installation documentation that comes with the server to help you with the installation of your Gen8 server.
CAUTION: HP recommends that at least two people are used for all rack server installations. Please refer to your installation instructions for proper tools and number of people to use for any installation

Step 2: Choose Required Options (only one of the following from each list unless otherwise noted)

HP Processors   **NOTE:** All processors within the server must be identical.
NOTE: All processor kits contain one processor. If two processors are desired, select one xxxxxx-L21 and one xxxxxx-B21. If four processors are desired, select one xxxxxx-L21 and three xxxxxx-B21. 3P configurations are not supported.

Eight-Core Processors

HP DL560 Gen8 Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) FIO Processor Kit   686843-L21
HP DL560 Gen8 Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) FIO Processor Kit   686832-L21

Configuration Information - Factory Integrated Models

	HP DL560 Gen8 Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) FIO Processor Kit	686845-L21
	HP DL560 Gen8 Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) FIO Processor Kit	686847-L21

Six-Core Processors

	HP DL560 Gen8 Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) FIO Processor Kit	686834-L21
	HP DL560 Gen8 Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) FIO Processor Kit	686822-L21
	HP DL560 Gen8 Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) FIO Processor Kit	686824-L21

Four-Core Processors

	HP DL560 Gen8 Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) FIO Processor Kit	686826-L21

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html
NOTE: LRDIMM and RDIMM are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen8 servers support RDIMM, UDIMM and LRDIMM.

Registered DIMMs (RDIMM)

	HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
	HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
	HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
	HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
	HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
	HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
	HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21

Load Reduced DIMMs (LRDIMM)

	HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

NOTE: All DDR3 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator.
NOTE: Kits described as LP include Low Power DIMMs. For more information on ProLiant Energy Efficient Features, see: www.hp.com/go/proliant-energy-efficient
NOTE: PC3L is a low voltage memory

HP Networking

NOTE: The HP ProLiant DL560 Gen8 server requires one FlexibleLOM to be installed in the FlexibleLOM slot.

FlexibleLOM Adapters

	HP Ethernet 1Gb 4-port 331FLR FIO Adapter	684208-B21
	HP Ethernet 10Gb 2-port 530FLR-SFP+ FIO Adapter	684210-B21

Configuration Information - Factory Integrated Models

	HP FlexFabric 10Gb 2-port 554FLR-SFP+ FIO Adapter	684213-B21
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: www.hp.com/go/ProLiantNICs.	
HP InfiniBand	HP InfiniBand FDR/EN 10/40Gb Dual Port 544FLR-QSFP Adapter	649282-B21
	HP InfiniBand QDR/EN 10Gb Dual Port 544FLR-QSFP Adapter	649283-B21
	NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/13078_na/13078_na.html	
HP Power Supplies	**NOTE:** Prior to making a power supply selection it is highly recommended that the HP Power Advisor is run to determine the right size power supply for your server configuration. The HP Power Advisor is located at: www.hp.com/go/hppoweradvisor.	
	HP Common Slot Platinum Plus Power Supply Kits	
	NOTE: The following Power Supply offer 94% efficiency with support for Intelligent Power Discovery.	
	HP 1200W Common Slot Platinum Plus Hot Plug Power Supply Kit	656364-B21
	NOTE: Option Kits for AC power supplies include the power supply and one PDU IEC cable.	
	NOTE: Power Specification and Technical Content for supported power supplies can be found at: http://h18000.www1.hp.com/products/quickspecs/14209_na/14209_na.html	

Step 3: Choose Additional Factory Integratable Options

HP Insight Software	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Single Server FIO License	582765-B21

Step 4: Choose Additional Options for Factory Integration

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" section below.

Core Options

HP Processors	**NOTE:** All processors within the server must be identical. **NOTE:** All processor kits contain one processor. If two processors are desired, select one xxxxxx-L21 and one xxxxxx-B21. If four processors are desired, select one xxxxxx-L21 and three xxxxxx-B21. 3P configurations are not supported. **NOTE:** The processor model as well as the memory configuration determines the maximum speed memory can operate. Please see the see the "Memory" section later in this document.

Eight-Core Processors

HP DL560 Gen8 Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) Processor Kit	686843-B21
HP DL560 Gen8 Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) Processor Kit/S-Buy	686843-S21

NOTE: -S21 Smart Buy processor options cannot be integrated at the factory.

HP DL560 Gen8 Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) Processor Kit	686832-B21
HP DL560 Gen8 Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) Processor Kit	686845-B21
HP DL560 Gen8 Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) Processor Kit	686847-B21

Six-Core Processors

HP DL560 Gen8 Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) Processor Kit	686834-B21
HP DL560 Gen8 Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) Processor Kit/S-Buy	686834-S21

NOTE: -S21 Smart Buy processor options cannot be integrated at the factory.

HP DL560 Gen8 Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) Processor Kit	686822-B21
HP DL560 Gen8 Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) Processor Kit	686824-B21

Four-Core Processors

HP DL560 Gen8 Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) Processor Kit	686826-B21

NOTE: Up to 4 processors supported. Performance Model includes four processors.

HP Memory	**NOTE:** HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html **NOTE:** LRDIMM and RDIMM are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen8 servers support RDIMM, UDIMM and LRDIMM.

Registered DIMMs (RDIMM)

HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21

Core Options

HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21

Load Reduced DIMMs (LRDIMM)

HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

NOTE: All DDR3 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator.
NOTE: Kits described as LP include Low Power DIMMs. For more information on ProLiant Energy Efficient Features, see: www.hp.com/go/proliant-energy-efficient
NOTE: PC3L is a low voltage memory.

HP Optical Drives	HP Mobile USB Non Leaded System DVD RW Drive	701498-B21

HP Hard Drives	**NOTE:** The HP ProLiant DL560 Gen8 Smart Storage solutions are equipped with entirely re-designed Small Form Factor (SFF 2.5 in) hot plug carriers for HP Qualified Hard Drives and Solid State Drives. These new carriers provide status and activity indicators as well as caution indicators for "Do Not Remove".	

NOTE: The components of a storage subsystem (e.g. the drive, the HBA/controller, firmware, and the server backplane) should operate at the same data transfer rate or the system bandwidth will be negotiated down to an acceptable level for all components.
NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

SAS Hot Plug with SmartDrive SFF (2.5-inch) Enterprise Drives

HP 900GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652589-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652583-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652572-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652564-B21
HP 300GB 6G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652611-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	652605-B21

SAS Hot Plug SmartDrive SFF (2.5-inch) Midline Drives

HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	652749-B21
HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	652745-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/12244_na/12244_na.html

6G SAS ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

HP 800GB 6G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	690829-B21

Core Options

HP 400GB 6G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	690827-B21
HP 200GB 6G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	690825-B21

6G SAS SLC Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

HP 400GB 6G SAS SLC SFF (2.5-inch) SC Enterprise Performance 3yr Warranty Solid State Drive	653082-B21
HP 200GB 6G SAS SLC SFF (2.5-inch) SC Enterprise Performance 3yr Warranty Solid State Drive	653078-B21

3G SATA MLC Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

HP 400GB 3G SATA MLC SFF (2.5-inch) SC Enterprise Mainstream 3yr Warranty Solid State Drive	653120-B21
HP 200GB 3G SATA MLC SFF (2.5-inch) SC Enterprise Mainstream 3yr Warranty Solid State Drive	653118-B21
HP 100GB 3G SATA MLC SFF (2.5-inch) SC Enterprise Mainstream 3yr Warranty Solid State Drive	653112-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/14038_na/14038_na.html

Hard Drive Kits

NOTE: All Factory Integrated Models will be populated with sufficient hard drive blanks based on the number of initial hard drives ordered with the server.
NOTE: The part numbers for single HDD blanks below are provided should the customer require replacement HDD blanks for their server.

HP SFF Gen8 Hard Drive Blank Kit	666987-B21

HP Networking	**Gigabit Ethernet Adapters**	
	HP NC112T PCI Express Gigabit Server Adapter	503746-B21
	HP NC365T 4-port Ethernet Server Adapter	593722-B21
	HP Ethernet 1Gb 4-port 331T Adapter	647594-B21
	HP Ethernet 1Gb 2-port 361T Adapter	652497-B21
	HP Ethernet 1Gb 2-port 332T Adapter	615732-B21

10 Gigabit Ethernet Adapters
NOTE: A minimum of two Gigabytes (2 GB) of server memory is required per each adapter.
NOTE: Direct Attach Cable (DAC) for copper environments or fiber transceivers and cables for fiber-optic environments must be purchased separately.

HP NC523SFP 10Gb 2-port Server Adapter	593717-B21
HP Ethernet 10Gb 2-port 530SFP Adapter	652503-B21
HP NC552SFP 10Gb 2-port Ethernet Server Adapter	614203-B21

FlexibleLOM Adapters

HP Ethernet 1Gb 4-port 331FLR Adapter	629135-B21
HP Ethernet 10Gb 2-port 530FLR-SFP+ Adapter	647581-B21

Core Options

	HP Ethernet 10Gb 2-port 560SFP+ Adapter	665249-B21
	HP FlexFabric 10Gb 2-port 554FLR-SFP+ Adapter	629142-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information: www.hp.com/go/ProLiantNICs

HP InfiniBand	HP InfiniBand FDR/EN 10/40Gb Dual Port 544QSFP Adapter	649281-B21

NOTE: For the following two InfiniBand Adapters, only 1 FlexibleLOM can be added to the server, which is selected in Step 2 for the "Configuration Information - Factory Integrated Models" section. These two options are for upgrade or change from original configuration.

NOTE: FLR Indicates HP FlexibleLOM Adapter series.

	HP InfiniBand FDR/EN 10/40Gb Dual Port 544FLR-QSFP Adapter	649282-B21
	HP InfiniBand QDR/EN 10Gb Dual Port 544FLR-QSFP Adapter	649283-B21

NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/13078_na/13078_na.html

HP I/O Expansion Options	HP DL380p/385p/560 Gen8 3 Slot PCI-E Riser Kit	653206-B21
	HP DL380p/560 Gen8 2 Slot 2x16 PCI-E Riser Kit	653208-B21

HP Power Supplies	**NOTE:** Prior to making a power supply selection it is highly recommended that the HP Power Advisor is run to determine the right size power supply for your server configuration. The HP Power Advisor is located at: www.hp.com/go/hppoweradvisor.	

HP Common Slot Platinum Plus Power Supply Kits
NOTE: The following Power Supplies offer 94% efficiency with support for Intelligent Power Discovery

	HP 1200W Common Slot Platinum Plus Hot Plug Power Supply Kit	656364-B21

NOTE: Option Kits contain optional power supply, an IEC power cable and PDU IEC cables.

NOTE: Power Specification and Technical Content for supported power supplies can be found at: http://h18000.www1.hp.com/products/quickspecs/14209_na/14209_na.html

HP Graphic Options	HP 150W PCI-E Power Cable Kit	669777-B21

Additional Options

NOTE: Some options may not be integrated at the factory. To ensure only valid configurations are ordered, HP recommends the use of an HP approved configurator. Contact your local sales representative for additional information.

HP Insight Software	**HP Insight Control**	
	HP Insight Control including 1yr 24x7 Technical Support and Updates Electronic License	T9074BAE
	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Electronic License	TC278AAE
	HP Insight Control including 1yr 24x7 Technical Support and Updates Single Server License	452148-B22
	HP Insight Management Media Kit	436222-B21

NOTE: HP Insight Management Media Kit contains DVDs without licenses. Contains HP Systems Insight Manager, HP Insight Control, HP Matrix Operating Environment, and Virtual Connect Enterprise Manager software. Uses an integrated installer to perform quick and accurate software installation and updates.

HP Insight Control Server Deployment

HP Insight Control Server Deployment Upgr to Insight Control including 1yr 24x7 Supp Electronic Lic	T9101ABE
HP Insight Control Server Deployment including 1yr 24x7 Support Electronic License	T9082AAE
HP Insight Control Server Deployment including 1yr 24x7 Support Single Server License	452151-B21

NOTE: Electronic and Flexible-Quantity licenses can be used to purchase multiple licenses with a single activation key.
NOTE: Customer will receive a license entitlement certificate. The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support and Update Service.
NOTE: Licenses ship without media. The HP Insight Management Media Kit can be ordered separately, or can be downloaded at: http://www.hp.com/go/insightupdates.
NOTE: For additional license kits please see the Insight Control QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12631_na/12631_na.html

HP Integrated Lights-Out (iLO) Advanced for ProLiant Remote Management

HP iLO Advanced including 1yr 24x7 Technical Support and Updates Electronic License	TA850AAE
HP iLO Advanced Electronic License with 3yr 24x7 Tech Support and Updates	BD506AAE
HP iLO Advanced including 1yr 24x7 Technical Support and Updates Single Server License	512485-B21
HP iLO Advanced 1 Server License with 3yr 24x7 Tech Support and Updates	BD505A
HP iLO Advanced including 1yr 24x7 Technical Support and Updates Flexible Quantity License	512486-B2
HP iLO Advanced Flexible Qty License with 3yr 24x7 Tech Support and Updates	BD506A
HP iLO Advanced including 1yr 24x7 Technical Support and Updates Tracking License	512487-B21
HP iLO Advanced Tracking License with 3yr 24x7 Tech Support and Updates	BD507A

NOTE: This license allows 1 server to be deployed and managed via HP iLO Advanced. Customer will receive a printed license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support Service.
NOTE: For additional license kits, including electronic delivery options, please see the

Additional Options

iLO QuickSpecs at:
http://h18004.www1.hp.com/products/quickspecs/14276_na/14276_na.html

High Performance Clusters	**HP Cluster Management Utility**	
	HP Insight Cluster Management Utility 1yr 24x7 Flexible License	QL803B
	HP Insight Cluster Management Utility 3yr 24x7 Flexible License	BD476A

NOTE: These part numbers can be used to purchase one certificate for multiple licenses and support with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key. Customer also will receive a support agreement.

	HP Insight Cluster Management Utility Media	BD477A

NOTE: For additional license kits please see the QuickSpecs at:
http://h18004.www1.hp.com/products/quickspecs/12612_na/12612_na.html

HP HPC Linux Value Pack

	HP High Performance Computing Linux Value Pack 1 Processor Flexible License for ProLiant Servers	TC293B

NOTE: This part number can be used to purchase one certificate for multiple licenses with a single activation key. Each license is for one socket (a.k.a. processor). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key.

	HP High Performance Computing Linux Value Pack Media Kit for ProLiant Servers	TC294A

NOTE: This part number can be used to purchase media including software and documentation, which will be delivered to the customer.

NOTE: For additional license kits please see the QuickSpecs at:
http://h18004.www1.hp.com/products/quickspecs/13485_na/13485_na.html

HP I/O Accelerator Options	**Second Generation Accelerators**	
	HP 365GB Multi Level Cell G2 PCIe ioDrive2 for ProLiant Servers	673642-B21
	HP 785GB Multi Level Cell G2 PCIe ioDrive2 for ProLiant Servers	673644-B21
	HP 1205GB Multi Level Cell G2 PCIe ioDrive2 for ProLiant Servers	673646-B21
	HP 2410GB Multi Level Cell G2 PCIe ioDrive2 Duo for ProLiant Servers	673648-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13587_na/13587_na.html
(Worldwide)

Additional Options

HP Security	HP Trusted Platform Module Option	488069-B21

NOTE: The TPM (Trusted Platform Module) is a microcontroller chip that can securely store artifacts used to authenticate the server platform. These artifacts can include passwords, certificates and encryption keys. Windows® BitLocker™ Drive Encryption (BitLocker) is a data protection feature available in Windows Server® 2008. BitLocker leverages the enhanced security capabilities of a Trusted Platform Module (TPM) version 1.2. The TPM works with BitLocker to help protect user data and to ensure that a server running Windows Server 2008 has not been tampered with while the system was offline. For more information about TPM, including a white paper, go to: www.hp.com/go/TPM.

NOTE: ProLiant OS pre-installed units will come with the partition required for TPM deployment.

NOTE: The TPM key is unique to every TPM deployed server and must be retained. Misplacing or losing the key could result in data loss.

	HP 2U Security Bezel Kit	666988-B21

HP Storage Controllers	**SAS Controllers**	

Smart Array P222 Controller
NOTE: P222 requires (1) HP Mini SAS Straight to Straight Cable Assembly (P/N 696195-B21)

	HP Smart Array P222/512 FBWC 6Gb 1-port Int/1-port Ext SAS Controller	631667-B21

Smart Array P420 Controller
NOTE: P420 requires (1) HP Mini SAS Straight to Straight Cable Assembly (P/N 696195-B21)

	HP Smart Array P420/1GB FBWC 6Gb 2-ports Int SAS Controller	631670-B21
	HP Smart Array P420/2GB FBWC 6Gb 2-ports Int SAS Controller	631671-B21

Smart Array P421 Controller

	HP Smart Array P421/1GB FBWC 6Gb 2-ports Ext SAS Controller	631673-B21
	HP Smart Array P421/2GB FBWC 6Gb 2-ports Ext SAS Controller	631674-B21

Smart Array P822 Controller

	HP Smart Array P822/2GB FBWC 2-ports Int/4-ports Ext SAS Controller	615418-B21

NOTE: P822 requires (1) HP Mini SAS Straight to Straight Cable Assembly (P/N 696195-B21)

Optional Upgrades

	HP 1GB P-series Smart Array Flash Backed Write Cache	631679-B21
	HP 2GB P-series Smart Array Flash Backed Write Cache	631681-B21
	HP 512MB P-series Smart Array Flash Backed Write Cache	661069-B21
	HP Smart Array Advanced Pack 2.0 No Media 1 Server 1yr 24x7 Support Software	BC377A
	HP Smart Array Advanced Pack 2.0 No Media Electronic Lic 1yr 24x7 Support Software	BC390AAE
	HP Smart Array Advanced Pack 2.0 No Media Flexible Qty 1yr 24x7 Support Software	BC390A

HP Cable Options

	HP DL560 Mini SAS Straight to Straight Cable Assembly	696195-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:

Additional Options

http://h18000.www1.hp.com/products/quickspecs/14227_na/14227_na.html
(Smart Array P222 Controller)
http://h18000.www1.hp.com/products/quickspecs/14228_na/14228_na.html
(Smart Array P420 Controller)
http://h18000.www1.hp.com/products/quickspecs/14229_na/14229_na.html
(Smart Array P421 Controller)
http://h18000.www1.hp.com/products/quickspecs/14341_na/14341_na.html
(Smart Array P822 Controller)
http://h18000.www1.hp.com/products/quickspecs/13200_na/13200_na.html
(Smart Array Advanced Pack)

Host Bus Adapter

HP H220 Host Bus Adapter	650933-B21
HP H221 Host Bus Adapter	650931-B21
HP H222 Host Bus Adapter	650926-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18004.www1.hp.com/products/quickspecs/14336_na/14336_na.html
(HBA 220)
http://h18004.www1.hp.com/products/quickspecs/14222_na/14222_na.html
(HBA 221)
http://h18004.www1.hp.com/products/quickspecs/14337_na/14337_na.html
(HBA 222)

HP Power Cords

NOTE: HP ProLiant servers ships with an IEC-IEC power cord used for rack mounting with Power Distribution Units (PDUs).

HP C13 - SEV 1011 CH 250V 10Amp 1.83m Power Cord	AF565A
HP C13 - DK-2.5A DK 250V 10Amp 1.83m Power Cord	AF566A
HP C13 - CEE-VII EU 250V 10Amp 1.83m Power Cord	AF568A
HP C13 - BS-1363A UK/HK/SG 250V 10Amp 1.83m Power Cord	AF570A
HP C13 - CEI-23-50 IT/CL 250V 10Amp 1.83m Power Cord	AF571A
HP C13 - SABS-164 ZA 250V 10Amp 2.5m Power Cord	AF567A
HP C13 - Nema 6-15P US 250V 15A JP 3.6m Power Cord	A0N33A
HP C13 - Nema 5-15P US/CA 110V 10Amp 1.83m Power Cord	AF556A

Additional Options

HP Tape Backup

NOTE: For the complete range of tape drives, autoloaders, libraries and media see: http://www.hp.com/go/tape. For hardware and software compatibility of HP tape backup products see: http://www.hp.com/storage/SPOCK and www.hp.com/go/ebs.
NOTE: For Internal drives to be connected to DL servers please make sure that you order rack mount kit as well.

HP DAT72 USB External Tape Drive	DW027B
HP DAT72 SCSI External Tape Drive	Q1523C
HP Ultrium 448 SCSI External Tape Drive	DW017C
HP Ultrium 448 SAS External Drive	DW086B
HP Ultrium 920 SCSI External Tape Drive	EH842B
HP Ultrium 920 SAS External Tape Drive	EH848B
HP LTO-4 Ultrium 1840 SCSI External WW Tape Drive	EH854B
HP LTO-4 Ultrium 1840 SAS External Tape Drive	EH861B
HP LTO-5 Ultrium 3280 SAS External Tape Drive	EH900B
HP LTO-4 Ultrium 1760 SAS External Tape Drive	EH920B
HP LTO-4 Ultrium 1760 SCSI External Tape Drive	EH922B
HP LTO-5 Ultrium 3000 SAS External Tape Drive	EH958B
HP StoreEver LTO-6 Ultrium 6250 Tape Drive in 1U Rack-mount Kit	C0L99A
HP StoreEver LTO-6 Ultrium 6650 Internal Tape Drive	EH963A
HP StoreEver LTO-6 Ultrium 6650 External Tape Drive	EH964A
HP StoreEver LTO-6 Ultrium 6250 Internal Tape Drive	EH969A
HP StoreEver LTO-6 Ultrium 6250 External Tape Drive	EH970A
HP MSL4048 2 LTO-5 Ultrium 3000 Fibre Channel Tape Library	BL543A

HP Storage Options

Storage Fibre Channel HBA
NOTE: For the complete listing of Fibre Channel Host Bus Adapters for Windows 2000, Windows Server 2003 and Linux, please see:
http://h18006.www1.hp.com/storage/saninfrastructure/hba.html

Brocade Fibre Channel HBAs

HP 81B 8Gb 1-port PCIe Fibre Channel Host Bus Adapter	AP769B
HP 82B 8Gb 2-port PCIe Fibre Channel Host Bus Adapter	AP770B

Emulex Fibre Channel HBAs

HP 81E 8Gb 1-port PCIe Fibre Channel Host Bus Adapter	AJ762B
HP 82E 8Gb 2-port PCIe Fibre Channel Host Bus Adapter	AJ763B

QLogic Fibre Channel HBAs

HP 81Q 8Gb 1-port PCIe Fibre Channel Host Bus Adapter	AK344A
HP 82Q 8Gb 2-port PCIe Fibre Channel Host Bus Adapter	AJ764A

Converged Network Adapter

HP CN1100E Dual Port Converged Network Adapter	BK835A
HP CN1000Q Dual Port Converged Network Adapter	BS668A

Additional Options

HP Uninterruptible Power Systems	HP Rack-mountable UPS	
	R5000 Uninterruptible Power System (UPS)	
	HP R1500 G3 Uninterruptible Power Supply (UPS)	AF471A
	HP R1.5kVA G3 1U NA Uninterruptible Power System	AF468A
	NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/14059_na/14059_na.html	
	HP R/T3000 G2 Uninterruptible Power System (UPS)	
	HP R/T3000 G2 2U L530 Low Voltage NA/JP Uninterruptible Power System	AF466A
	HP R/T3000 G2 2U L620 High Voltage NA/JP Uninterruptible Power System	AF467A
	NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/14058_na/14058_na.html	
	R5000 Uninterruptible Power System (UPS)	
	HP R5KVA 3U L630 High Voltage NA/JP Uninterruptible Power System	AF460A
	NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/14109_na/14109_na.html	
	R7000 Uninterruptible Power System (UPS)	
	HP R7KVA 4U 50A High Voltage NA/JP Uninterruptible Power System	AF462A
	HP R5KVA and R7KVA 3U Extended Runtime Module	AF464A
	NOTE: Please see the QuickSpecs for additional information: http://h18000.www1.hp.com/products/quickspecs/14110_na/14110_na.html	
	NOTE: For additional information on HP Uninterruptible Power Systems please go to: www.hp.com/servers/rackups.	
	NOTE: For additional information on sizing your server, please reference: http://www.upssizer.com.	
	NOTE: Please see the UPS and PDU cable matrix's on the HP Power Protection and Management page. Under Power Cords, click on the "HP Power Cord Matrix" link. That link will list cable descriptions, requirements, and specifications for UPS and PDU units. Please see the following link: www.hp.com/products/powercords.	

Additional Options

HP Power Distribution Units	**Monitored PDUs**	
	HP Monitored Power Distribution Unit: Full Rack Version	
	HP 8.6kVA 24A Single Input Three Phase NA/JP Monitored Power Distribution Unit	AF504A
	HP 8.3kVA 40A Single Input Single Phase NA/JP Monitored Power Distribution Unit	AF506A
	HP Monitored Power Distribution Unit: Half Rack Version	
	HP 4.9kVA 24A Single Input Single Phase NA/JP Monitored Power Distribution Unit	AF914A

NOTE: Please see the following QuickSpecs for additional information:
http://h18000.www1.hp.com/products/quickspecs/12118_na/12118_na.html

Modular PDUs 1U/0U
NOTE: 1U/0U mounting brackets shipped with the unit (optimized for 10000 G2 and 9000 series racks).

	HP 4.9kVA 24A High Voltage NA/JP Modular Power Distribution Unit	252663-D72
	HP 8.3kVA 40A High Voltage NA/JP Modular Power Distribution Unit	252663-D73

NOTE: For additional information on HP Power Distribution Units including accessories please go to: www.hp.com/go/pdu.
NOTE: Please see the UPS and PDU cable matrix's on the HP Power Protection and Management page. Under Power Cords, click on the "HP Power Cord Matrix" link. That link will list cable descriptions, requirements, and specifications for UPS and PDU units. Please see the following link: www.hp.com/products/powercords.
NOTE: This PDU has a detachable input power cord and allows for adaptability to country specific power requirements.

NOTE: Please see the following QuickSpecs for additional options including shorter jumper cables and country specific power cords:
http://h18000.www1.hp.com/products/quickspecs/11041_na/11041_na.html

HP Intelligent Power Distribution Units (iPDU)	**iPDU Core Units**	
	HP 4.9kVA 24A Single Phase NA/JP Core Intelligent Modular Power Distribution Unit	AF520A
	HP 8.6kVA 24A Three Phase NA/JP Core Intelligent Modular Power Distribution Unit	AF522A
	iPDU Extension Bars	
	HP 5xC13 Intelligent PDU Extension Bar G2 Kit	AF547A
	HP 5xC13 Outlets Power and UID LEDs Pair Standard Extension Bar	AF528A

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13650_na/13650_na.html

HP Rack Series	**HP Intelligent Series Rack**	
	HP 636 1075mm Pallet Intelligent Series Rack	BW895A
	HP 636 1075mm Shock Intelligent Series Rack	BW896A
	HP 642 1075mm Pallet Intelligent Series Rack	BW903A
	HP 642 1075mm Shock Intelligent Series Rack	BW904A
	HP 647 1075mm Pallet Intelligent Series Rack	BW911A
	HP 647 1075mm Shock Intelligent Series Rack	BW912A

Additional Options

NOTE: Please see the QuickSpecs for Technical Specifications such as height, width, depth, weight, and color:
http://h18000.www1.hp.com/products/quickspecs/14223_na/14223_na.html
NOTE: For additional information regarding Rack Cabinets, please see the following URL: http://www.hp.com/go/rackandpower.

HP Rack Options	**HP Location Discovery Services**	
	HP 36U Location Discovery Kit	BW945A
	HP 42U Location Discovery Kit	BW946A
	HP 47U Location Discovery Kit	BW947A

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/14429_na/14429_na.html

HP USB Keyboard and Mouse

HP USB BFR with PVC Free US Keyboard/Mouse Kit	631341-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13972_na/13972_na.html

HP TFT7600 G2 KVM Console Rackmount Keyboard Monitor

HP TFT7600 G2 KVM Console Rackmount Keyboard US Monitor	AZ870A
HP TFT7600 G2 KVM Console Rackmount Keyboard US TAA Monitor	AZ885A

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13731_na/13731_na.html

HP Server Console Switches

HP Server Console 0x2x8 Port Analog Switch	AF616A
HP Server Console 0x2x16 Port Analog Switch	AF617A
HP TAA 0x2x16xKVM Server Console G2 Switch	AF626A

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/11834_na/11834_na.html

HP Server Console Switch G2 with Virtual Media & CAC

HP 0x2x16 KVM Server Console Switch G2 with Virtual Media CAC Software	AF618A
HP 0x2x32 KVM Server Console Switch G2 with Virtual Media CAC Software	AF619A
HP KVM CAT5 1-pack USB Interface Adapter	336047-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13475_na/13475_na.html

HP IP Console Switch G2 with Virtual Media & CAC

HP 1x4 USB/PS2 KVM Console Switch	AF611A
HP 1x1Ex8 KVM IP Console Switch G2 with Virtual Media CAC Software	AF620A
HP 2x1Ex16 KVM IP Console Switch G2 with Virtual Media CAC Software	AF621A
HP 4x1Ex32 KVM IP Console Switch G2 with Virtual Media CAC Software	AF622A

Additional Options

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/13474_na/13474_na.html

HP USB and SD Options	HP USB 04 Standard Keyboard	DT528A#ABA
	HP 2GB USB Flash Media Drive Key Kit	608447-B21
	NOTE: HP qualified blank USB key for use with HP ProLiant servers that support the VMware virtualization environment and other HP value-add software. HP recommends this industry standard USB flash device for use with VMware ESXi. USB device must be installed in the internal slot of the ProLiant server for use with VMware ESXi. Refer to HP VMware Getting Started Guide for installation instructions.	
	HP 4GB Micro SDHC Flash Media Kit	647444-B21
	NOTE: Blank SD media device is supported for use with VMware and Citrix. SD media must be installed in the internal slot of the ProLiant server. Learn more at: http://www.hp.com/go/proliantvirtualization.	

HP Care Pack Services	HP 3 year Next business day with Defective Media Retention ProLiant DL560 Hardware Support	U6G41E
	HP 3 year Next business day ProLiant DL560 Collaborative Support	U6G42E
	HP 3 year Next business day with Defective Media Retention ProLiant DL560 Collaborative Support	U6H01E
	HP 3 year Next business day ProLiant DL560 Proactive Care Service	U6H02E
	HP 3 year Next business day with Defective Media Retention ProLiant DL560 Proactive Care Service	U6H03E
	HP 3 year 4 hour 24x7 ProLiant DL560 Hardware Support	U6H06E
	HP 3 year 4 hour 24x7 with Defective Media Retention ProLiant DL560 Hardware Support	U6H07E
	HP 3 year 4 hour 24x7 ProLiant DL560 Collaborative Support	U6H08E
	HP 3 year 4 hour 24x7 with Defective Media Retention ProLiant DL560 Collaborative Support	U6H09E
	HP 3 year 4 hour 24x7 ProLiant DL560 Proactive Care Service	U6H10E
	HP 3 year 4 hour 24x7 with Defective Media Retention ProLiant DL560 Proactive Care Service	U6H11E
	HP 3 year 6 hour Call to Repair 24x7 ProLiant DL560 Hardware Support	U6H12E
	HP 3 year 6 hour Call To Repair 24x7 with Defective Media Retention ProLiant DL560 HW Support	U6H13E
	HP 3 year 6 hour Call To Repair 24x7 ProLiant DL560 Collaborative Support	U6H14E
	HP 3 year 6 hour Call To Repair 24x7 w/Defective Media Retention ProLiant DL560 Collaborative Supp	U6H15E
	HP 3 year 6 hour Call To Repair 24x7 ProLiant DL560 Proactive Care Service	U6H16E
	HP 3 year 6 hour Call To Repair 24x7 w/Defective Media Retention ProLiant DL560 Proactive Care Serv	U6H17E
	HP Install ProLiant DL560 Service	U6H58E
	HP Installation Non Standard Hours ProLiant DL560 Service	U6H59E

Additional Options

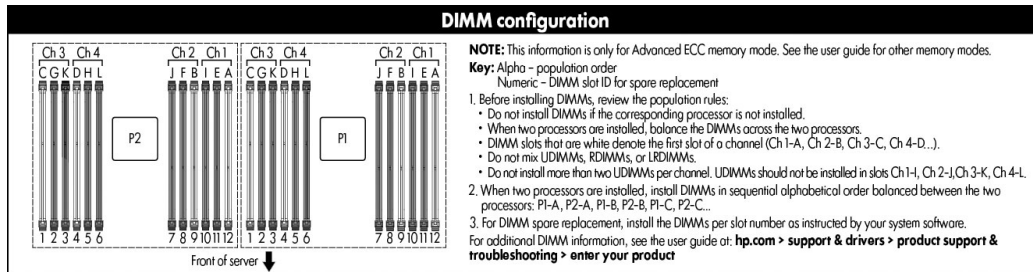|	
HP Startup ProLiant DL560 Service	U6H60E
HP Startup non Standard Hours Proliant DL560 Service	U6H61E
HP 3 year Next business day ProLiant DL560 with Insight Control Proactive Care Service	U6H88E
HP 3 year Next business day w/Defective Media Retention DL560 w/Insight Control Proactive Care SVC	U6H89E
HP 3 year 4 hour 24x7 ProLiant DL560 with Insight Control Proactive Care Service	U6H90E
HP 3 year 4 hour 24x7 w/Defective Media Retention DL560 with Insight Control Proactive Care Service	U6H91E
HP 3 year 6 hour Call To Repair 24x7 ProLiant DL560 with Insight Control Proactive Care Service	U6H92E
HP 3 yr 6hr CallToRepair 24x7 w/Defective Media Retention DL560 w/Insight Control Proactive Care SVC	U6H93E
HP 3 year Support Plus 24 Insight Control ProLiant DL560 Service	U6H94E
HP Installation of ProLiant Add On/In Options Service	UH745E
HP Installation and Startup for Insight Control Server Deployment - previously Rapid Deployment Pack	U5683E

Memory

For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool:
www.hp.com/go/ddr3memory-configurator

Memory Subsystem Architecture

Each Intel® Xeon® E5-4600 family processor socket contains four memory channels that support three DIMMs each for a total of twelve (12) DIMM per installed processor or a grand total of forty-eithy (48) DIMMs for the server. Up to 32GB capacity DIMMs are supported for 1.5TB of memory (48 DIMM slots x 32GB per DIMM).

Memory population guidelines

General Memory Population Rules and Guidelines:

- White DIMM slots denote the first slot of a channel. For 1 DPC (DIMM per channel) populate white slots only.
- Install DIMMs only if the corresponding processor is installed.
- If only one processor is installed, only a quarter of the DIMM slots (12) are available. If only two processors are installed, only half of the DIMM slots (24) are available.
- To maximize performance, it is recommended to balance the total memory capacity between all installed processors and to load the channels similarly whenever possible.
- Populate DIMMs from heaviest load (quad-rank) to lightest load (single-rank) within a channel. Heaviest load (DIMM with most ranks) within a channel goes furthest from the processor
- RDIMMs operating at either 1.35V or 1.5V may be mixed in any order, but the system will power them at the higher voltage.
- Do not mix RDIMMs and LRDIMMs.
- LRDIMMs are supported up to 3 DIMMs per channel.
- Using the HP RBSU, 1.35V DIMMs can be changed to operate at 1.5V.
- DIMMs of different speeds may be mixed in any order; the server will select a common optimal speed.
- The maximum memory speed is a function of the memory type, memory configuration, and processor model.
- The maximum memory capacity is a function of the memory type and number of installed processors.
- HP memory from previous generation servers is not qualified on the DL560 Gen8 Server. Certain HP SmartMemory features such as memory authentication and enhanced performance may not be supported.
- To realize the performance memory capabilities listed in this document, HP SmartMemory is required. For additional information, please see the HP SmartMemory QuickSpecs at:
  http://h18000.www1.hp.com/products/quickspecs/14225_na/14225_na.html.
- For memory population rules and additional memory guidelines, please see the DL560 Gen8 user guide at
  http://www.hp.com/support.

Memory

DL560 Gen8 Supported Memory Bandwidth and Capacity								
DIMM Type	Registered DIMMS (RDIMMs)							Load Reduced (LRDIMMs)
DIMM Rank	Single Rank (1R)			Dual Rank (2R)				Quad Rank (4R)
DIMM Capacity	4GB	4GB	8GB	8GB	8GB	16GB	16GB	32GB
DIMM Native Speed (MHz)	1333	1600	1600	1333	1600	1333	1600	1333
Voltage	LV	Std	Std	LV	Std	LV	Std	LV
SLOTS THAT CAN BE POPULATED								
48 slot servers	48	48	48	48	48	48	48	48
MAXIMUM CAPACITY (GB)*								
48 slot servers	192	192	384	384	384	768	768	1536
POPULATED DIMM SPEED (MHz)								
1 DIMM Per Channel	1333	1600	1600	1333	1600	1333	1600	1333***
2 DIMM Per Channel	1333	1600	1600	1333	1600	1333	1600	1333***
3 DIMM Per Channel	1066**	1333##	1333##	1066**	1333##	1066**	1333##	1066

NOTES:
Memory speed is a function of the processor QPI bus speed. To realize the performance memory capabilities listed above HP SmartMemory is required.
* Maximum capacity will vary based on individual server platform qualification schedule
** For HP SmartMemory RDIMM supports up to 3DPC@1066 at 1.35V. Third party memory may only support up to 3DPC@1066 at 1.5V.
*** LRDIMMs enable 3 DIMMs per channel. HP SmartMemory will support up to 3DPC@1066 at 1.35V. Third party memory may only support 3DPC @1066 at 1.5V.
**** For HP SmartMemory, UDIMM is supported at 2DPC@1333 at 1.35V. Third party memory may only support up to 2DPC@1066 at 1.5V.
RBSU setting required

Memory Speed by Processor Model

Processor Models	Supported Memory Speeds
E5-4650, E5-4650L, E5-4640	1600/1333/1066/800MHz
E5-4620, E5-4617, E5-4610, E5-4607	1333/1066/800MHz
E5-4603	1066/800MHz

Standard and Maximum Memory Capacity (Pre-configured Models)

Memory

Pre Configured Models	Standard Memory	Maximum Memory Plus Optional Memory	Standard Memory Replaced with Optional Memory
Intel Xeon E5-4640	64GB (8x 8GB)	704GB (40x16GB, 4x8GB)	1.5TB (48 x 32GB)
Intel Xeon E5-4610	32GB (4x 8GB)	736GB (44x16GB, 4x4GB)	1.5TB (48 x 32GB)
Intel Xeon E5-4603	16GB (2x 8GB)	752GB (46x16GB, 1x4GB)	1.5TB (48 x 32GB)

DIMM slot and configuration diagrams
Basic memory slot & population diagram
Population order; start with "A" first, "B" second, "C" third, etc.
When one processor is installed, install DIMMs in sequential alphabetic order: A, B, C, D, E, F ...
When two processors are installed, install DIMMs in sequential
alphabetic order: CPU1-A, CPU2-A,CPU1-B,CPU2-B,CPU1-C, CP2-C

		48 DIMM SLOTS (12 per CPU node)			
		population order	slot #	population order	
Chnl 3	1	C	1	C	Chnl 3
	2	G	2	G	
	3	K	3	K	
Chnl 4	4	D	4	D	Chnl 4
	5	H	5	H	
	6	L	6	L	
	CPU1		CPU2		
Chnl 2	7	J	7	J	Chnl 2
	8	F	8	F	
	9	B	9	B	
Chnl 1	10	I	10	I	Chnl 1
	11	E	11	E	
	12	A	12	A	

		population order	slot #	population order	
Chnl 3	1	C	1	C	Chnl 3
	2	G	2	G	
	3	K	3	K	
Chnl 4	4	D	4	D	Chnl 4
	5	H	5	H	
	6	L	6	L	
	CPU3		CPU4		
Chnl 2	7	J	7	J	Chnl 2
	8	F	8	F	
	9	B	9	B	
Chnl 1	10	I	10	I	Chnl 1
	11	E	11	E	
	12	A	12	A	

NOTE: Capacity references are rounded to the common Gigabyte values.

Memory

- 1GB = 1024MB
- 2GB = 2048MB
- 4GB = 4096MB
- 8GB = 8192MB
- 16GB = 16384MB
- 32GB = 32768MB

DDR3 memory options part number decoder

HP ggggg eRxff PC3 v-wwwwwm-aa bb-ccd Kit

Capacity
- 1GB
- 2GB
- 4GB
- 8GB
- 16GB
- 32GB

Rank
- 1R = single
- 2R = dual
- 4R = quad

Data Width
- x8 = 8
- X4 = 4

Memory Type
PC3 = DDR3

Voltage
Blank = 1.5V
L = 1.35V

Module Bandwidth
- 8500MB/s (DDR3-1066)
- 10600MB/s (DDR3-1333)
- 12800MB/s (DDR3-1600)

CAS Latency
- 7 = 7-7-7
- 8 = 8-8-8
- 9 = 9-9-9
- 11 = 11-11-11

DIMM Type
E = Unbuffered with ECC
R = Registered
L = Load Reduced

Special Descriptor
(If Needed)
- LP (Low Power)

Following are memory options available from HP:

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_div/14225_div.html

NOTE: LRDIMM and RDIMM are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen8 servers support RDIMM, UDIMM and LRDIMM.

Registered DIMMs (RDIMM)

HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21

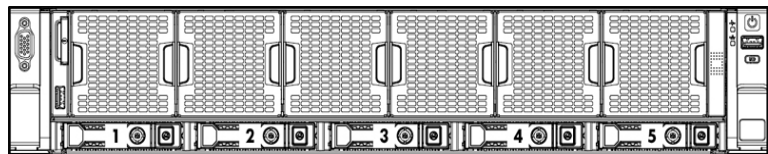**Load Reduced DIMMs (LRDIMM)**

Memory

HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

NOTE: All DDR3 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator.

NOTE: PC3L is a low voltage memory

Storage

1-5   Five SFF SAS hot plug drive bays

Drive Support

External Storage

	Quantity Supported	Position Supported	Host Controller or Adapter
D2600 Disk Enclosure	Up to 4	External	HP Smart Array P222 Controller
	Up to 8		HP Smart Array P421 Controller
			HP Smart Array P822 Controller
D2700 Disk Enclosure	Up to 4	External	HP Smart Array P222 Controller
	Up to 8		HP Smart Array P421 Controller
			HP Smart Array P822 Controller

Maximum Storage Capacity - (with D2700, SAS HDD)

Internal	5TB (5 SFF HDs x 1TB SAS SFF)
External	200TB (200 x 1TB SAS SFF)
Total	205TB

Technical Specifications

System Unit	Dimensions (H x W x D) (with bezel)		SFF Drives: 3.44 x 17.54 x 29.50 in (8.73 x 44.55 x 74.93 cm)
	Weight (approximate)	Maximum (all SFF hard drives, power supply, and processor installed)	61.00 lb (27.66 kg)
	Input Requirements (per power supply)	Rated Line Voltage	100 to 120 VAC 200 to 240 VAC
		Rated Input Current	For 1200 W Power Supply: 10 A (at 100 VAC), 4.9 A (at 200 VAC)
		Rated Input Frequency	50 to 60 Hz
		Rated Input Power	For 1200 W Power Supply: 930 W (at 100 VAC), 1348 W (at 200 VAC)
	BTU Rating	Maximum	For 1200 W Power Supply: 3530 BTU/hr (at 100 VAC), 4600 BTU/hr (at 200 VAC)
	Power Supply Output (per power supply)	Rated Steady-State Power	For 1200 W Power Supply: 800 W (at 100 VAC), 900 W (at 120 VAC), 1200 W (at 200 to 240 VAC)
		Maximum Peak Power	For 1200 W Power Supply: 800 W (at 100 VAC), 900 W (at 120 VAC), 1200 W (at 200 to 240 VAC) For 750 W Power Supply: 750 W (at 100 to 120 VAC), 750 W (at 200 to 240 VAC) For 460 W Power Supply: 460 W (at 100 to 120 VAC), 460 W (at 200 to 240 VAC)
	System Inlet Temperature	Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 304.8 m (1.8°F per every 1000 ft) above sea level to a maximum of 3048 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).
		Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).
	Relative Humidity (non-condensing)	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
		Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.

Technical Specifications

Altitude	Operating	3048 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
	Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).

Acoustic Noise

Listed are the declared A-Weighted sound power levels (LWAd) and declared average bystander position A-Weighted sound pressure levels (LpAm) when the product is operating in a 23°C ambient environment. Noise emissions were measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). The listed sound levels apply to standard shipping configurations. Additional options may result in increased sound levels.

NOTE: The Listed sound levels apply to standard shipping configurations. Additional options may result in increased sound levels.

	Entry	Base	Performance
Idle			
L WAd	4.1 B	4.1 B	4.1 B
L pAm	25 dBA	25 dBA	25 dBA
Operating			
L WAd	4.3 B	4.7 B	5.0 B
L pAm	27 dBA	31 dBA	35 dBA

Emissions Classification (EMC)	**FCC Rating**	Class A
	Normative Standards	CISPR 22; EN55022; EN55024; FCC CFR 47, Pt 15; ICES-003; CNS13438; GB9254; K22;K24; EN 61000-3-2; EN 61000-3-3; EN 60950-1; IEC 60950-1

NOTE: Product conformance to cited product specifications is based on sample (type) testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.
NOTE: The Listed sound levels apply to standard shipping configurations. Additional options may result in increased sound levels.

Technical Specifications

HP Smart Array P420i Controller	**Dimensions**	Embedded
	Disk Drive and Enclosure Interface - Transfer rate	6Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	SAS Connectors	2 internal 4X connectors
	Cache Memory Speed	512MB FBWC - DDR3-1333MHz with 40-bit wide bus, 1GB or 2GB FBWC DDR3-1333MHz with 72-bit wide bus
	Server Interface	x8 PCIe 3.0 provides 2GB/s maximum bandwidth
	SAS Speed	(8) 6Gb/s SAS links provide 4.8GB/s maximum bandwidth
	Cache Memory	Zero Memory RAID has no cache memory 40-bit 512MB FBWC 72-bit 1GB FBWC or 72-bit 2GB FBWC
	Logical Drives Supported	Zero Memory, Up to 2 logical volumes (5SFF physical drives) Up to 64 logical drives with cache
	Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
	RAID Support	RAID 6, 6+0 (Advanced Data Guarding) and RAID1 (Advanced Data Mirroring) & RAID 1+0 (Advanced Data Mirroring) **NOTE:** RAID 6, 6+0 can be enabled with one of the following combinations: • 512MB FBWC and Smart Array Advanced Pack License key option upgrades • 1GB or 2GB FBWC and Smart Array Advanced Pack License key option upgrades RAID 5, 5+0 (Distributed Data Guarding) **NOTE:** A minimum of 512MB cache is required to enable RAID 5, 5+0 support RAID 1+0 (Striping & Mirroring) RAID 0 (Striping), RAID 1 (Mirroring)

HP Ethernet 1Gb 4-port 331FLR Adapter	**HP Flexible Network Technology**	HP Flexible Network Technology consists of replaceable network solutions to meet the customers require now or in the future.
	Network Interface	10Base-T/100Base-TX/1000Base-TX
	Compatibility	EEE 802.3 10Base-T IEEE 802.3ab 1000Base-T IEEE 802.3u 100Base-TX IEEE 802.3ad 1000Base-TX IEEE 802.1p 100Base-TX IEEE 802.1q 100Base-TX
	Data Transfer Method	PCI Express, four lanes (x4)
	Chipset	BCM5719
	Network Transfer Rate	10Base-T (Half-Duplex) 10 Mb/s 10Base-T (Full-Duplex) 20 Mb/s 100Base-TX (Half-Duplex) 100 Mb/s 100Base-TX (Full-Duplex) 200 Mb/s

Technical Specifications

		1000Base-TX (Half and Full-Duplex)	2000Mb/s
	Connector	Four RJ-45	
	Cable Support	10Base-T	Categories 3, 4 or 5 UTP; up to 328 ft (100 m)
		100Base-TX	Category 5 or higher UTP; up to 328 ft (100 m)
		1000BaseTX	Category 5 or higher UTP; up to 328 ft (100 m)

HP Ethernet 10Gb 2-port 530FLR-SFP+ Adapter	**Network Interface**	SFP+ for Direct Attach Cable copper or fibre	
	Compatibility	EEE 802.3 SFP+ (SX, SR & LR)	
		IEEE 802.3x	
		IEEE 802.3ad	
		IEEE 802.1q	
		IEEE 802.3x	
		IEEE 802.1au	
		IEEE 802.3ap	
	Data Transfer Method	PCI Express, eight lanes (x8)	
	Chipset	BCM57810S	
	Network Transfer Rate	10Base-T (Half-Duplex)	10Gbps
		10Base-T (Full-Duplex)	1Gbps
	Connector	Two SFP+	
	Cable Support	10Base-T	Categories 3, 4 or 5 UTP; up to 328 ft (100 m)
		100Base-TX	Category 5 or higher UTP; up to 328 ft (100 m)
		1000BaseTX	Category 5 or higher UTP; up to 328 ft (100 m)

Technical Specifications

Environment-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green. To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
		The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.